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Methaemoglobinaemia with concurrent blood isolation of Saccharomyces and Candida

Saccharomyces boulardii is closely related to *Saccharomyces cerevisiae* and is used as biotherapeutic agent,[1] although some reports suggest pathogenicity.[2] We present a case of neonatal fungaemia with concurrent methaemoglobinaemia, occurring after a brief period of treatment with *S boulardii*. A male infant was born at 30 weeks of gestational age by caesarean section because of intrauterine growth restriction and maternal hypertension. The baby was well apart from persistent gastrointestinal symptoms that hampered feeding and forced parenteral support. During the third week of life, administration of *S boulardii* (Codex DNB; half a capsule a day, equivalent to 2.5×10^9 organisms) was started in an attempt to prevent bacterial overgrowth. After four days of treatment, the baby developed symptoms suggesting sepsis and an unexplained methaemoglobinaemia (methaemoglobin concentration = 16%). Codex was stopped and empirical antibiotic coverage, including liposomal amphotericin B, was started. Blood cultures showed growth of *Candida albicans*, but the central venous catheter tip was negative. Methaemoglobin levels halved in two days (7%), but remained constant during the following two weeks of antifungal treatment. Blood cultures at that point showed growth of *S cerevisiae*, which is susceptible to amphotericin B, in the absence of any clinical finding; again, the catheter tip was sterile. Methaemoglobin concentration was still abnormal (6.2%). Liposomal amphotericin B treatment was prolonged for a further six days and then discontinued. At this time, methaemoglobin levels were near normal (3%), and blood cultures were negative. The gastrointestinal symptoms resolved with age and full gastrointestinal function was achieved.

Recovery of *Saccharomyces* two weeks after administration had been stopped suggests persistence in the gut. It is tempting to think that the methaemoglobinaemia was caused by the continued presence of the yeasts, perhaps through excessive host production of nitric oxide. Several studies have shown that nitric oxide plays a pivotal role in the interaction between yeasts and the phagocytic system,[3] and it is well known that this radical readily oxidises haemoglobin. It is also reasonable to link late bloodstream invasion by *Saccharomyces* to previous enteric mucosal damage caused by a *Candida* infection, which was itself probably gut related. The recovery of *S cerevisiae* in place of *S boulardii* has been reported by others,[4] and can be explained by the similarities between the two. It is ironic that the intervention used to prevent sepsis from enteric overgrowth not only did not succeed but was itself a cause of the problem that it was intended to prevent.

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Wafting does work

We were interested to see the article "Oxygen administration in infants",[1] and *e*Letter responses. The original article and *e*Letters were unsure of the efficacy of "non-contact" oxygen delivery or "wafting" as it is more commonly known. Our study "The efficacy of noncontact oxygen delivery methods",[2] demonstrated how effective wafting oxygen can be. We found that an area of 34cm by 37cm obtained a concentration of >30% when oxygen is delivered by face mask at 10 l /minute. Although this is not a substitution for the more reliable methods of administration as detailed by Drs Frey and Shann, in the short term it can be used with confidence.

We caution against holding a self inflating resuscitation bag over an infant's airway (without manipulation of the bag itself), as it delivers a negligible amount of oxygen. It is much more efficient to use the oxygen tubing without any attachments.

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CORRECTION

We wish to apologise for an error that occurred in a letter by Daniels *et al* (*Arch Dis Child Fetal Neonatal Ed* 2003;**88**:F257). The first line of the third paragraph should have read: The salient results were that two thirds of granulomas resolved over a three week period without cauterisation.